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AUTHOR O'Brien, Alexander
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ABSTRACT

This solar energy learning module for use with junior high school students offers a list of activities, a pre-post test, job titles, basic solar energy vocabulary, and diagrams of solar energy collectors and installations. The purpose is to familiarize students with applications of solar energy and titles of jobs where this knowledge could be applied. (CP)

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ED179793

# COLLECTING SOLAR ENERGY

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Alexander O'Brien
Solar Energy Education Project

OEO 23.5-48

This unit is designed to acquaint the student with the collection and application of solar energy to various situations. Also mentioned in the unit is the procedure for starting a solar "set-up" of their own.

OBJECTIVES

1. The student will become acquainted with the applications of solar energy.
2. The student will become familiar with the job opportunities in the solar field.
3. The student will become familiar with different types of solar collectors.
4. The students will increase their vocabulary pertaining to the solar field.

PRE-POST TEST

1. Can the sun's energy be put to practical use? Yes___ No___

2. Are there products you can buy called solar collectors? Yes___ No___

3. Is the use of solar energy a new idea? Yes___ No___

4. Are there many companies on the market making solar equipment? Yes___ No___

5. Can solar energy heat your house? Yes___ No___

6. Can solar energy air condition a house? Yes___ No___

7. Can solar energy produce electricity? Yes___ No___

8. What is a "greenhouse effect"?

_____

_____

_____

9. What is the main part of a solar system?

_____

_____

_____

10. What occupations are associated with solar energy? List at least five.

1. _____
2. _____
3. _____
4. _____
5. _____

ACTIVITIES

Day 1 - Historical Background

Sun Power

1. Discuss how the ancient Egyptians and other groups used the sun's rays.
2. Discuss how we use the sun in our everyday life.
3. Have the class examine the principles of the magnifying glass focusing the light causing paper to burn. Discuss what happened to cause this.
4. Administer the pre-test to the class.

Day 2 - Solar Panel - Greenhouse Effect

1. Review the diagram of a solar panel pointing out the various parts.
    a. Discuss why the different parts are necessary to the panel.
2. Discuss what the "greenhouse effect" is.
    a. Review how it heats a house in the winter.
    b. Review how it works in a greenhouse.
3. Discuss how the "greenhouse effect" works in a solar panel.
    a. Review the process and its benefit in a solar panel.
    b. Discuss how this principle heats the fluid in the panel.

Day 3 - Solar System

1. Review the diagram of the solar system.
    a. Discuss the "complexity" of a solar system.
    b. Discuss the different parts and the function they serve.

Day 4 - Solar Applications

1. Discuss the applications of solar energy now in use.
   a. Review over each type (with diagrams) and compare the similarities/differences.
   b. Discuss the pros and cons of each system.
2. Have each student design a solar swimming pool heating system including all the parts (based on Day 3 Lesson).

Day 5 - Job Opportunities

1. Review over the solar swimming pool designs.
   a. Discuss what basic things would be needed for the system.
   b. Have the students exhibit their systems.
2. Discuss the types of job offers available in the solar field.
   a. Have the students review the "solar system" sheet and from that sheet, list the different types of career possibilities.
   b. Review the list adding to it if some careers are not mentioned.
3. Administer the post test at the conclusion of the lesson.

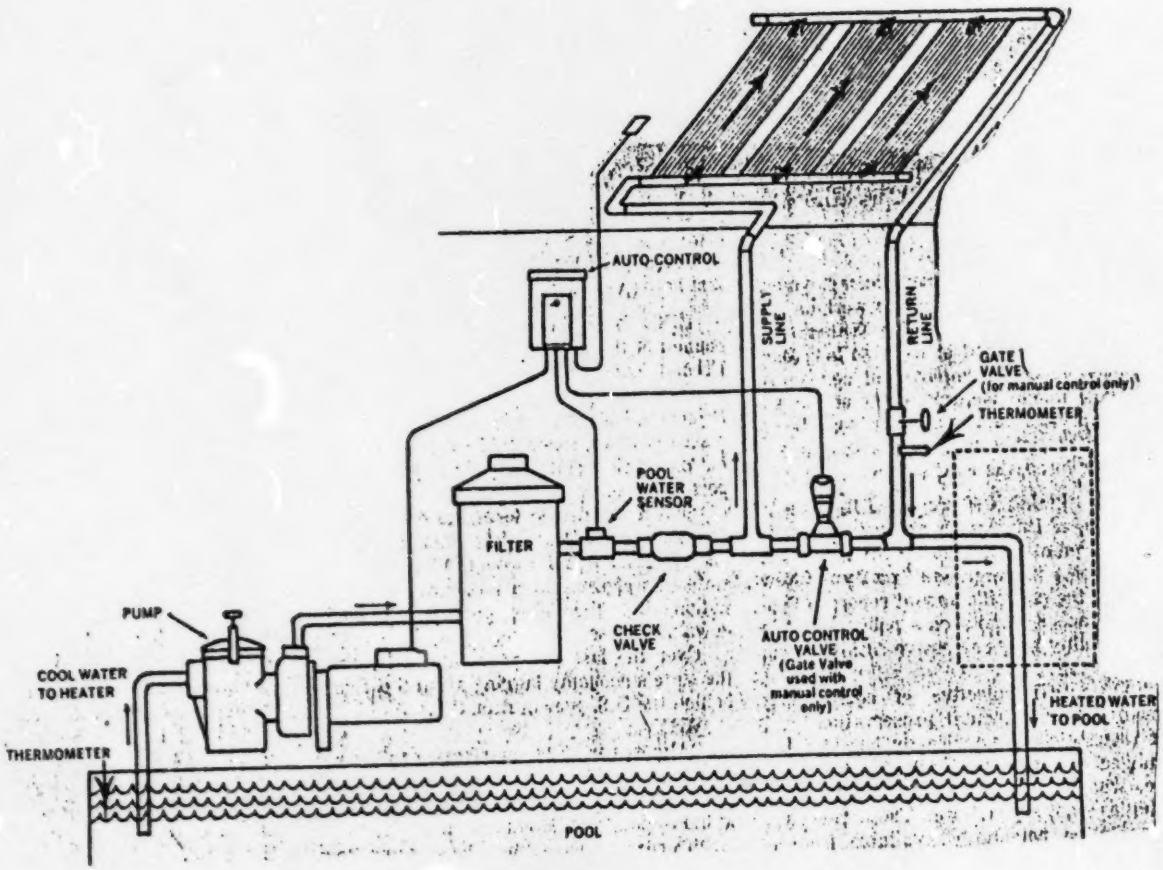
VOCABULARY

| | |
|---|---|
| SOLAR PANEL (COLLECTOR) | - device used to collect the sun's energy. |
| GREENHOUSE EFFECT | - trapping the sun's energy in the form of heat. |
| DOMESTIC | - having to do with the home. |
| SPACE HEATING | - system used to heat something. |
| HEAT TRANSFER | - to convey from one substance to another. |
| STORAGE | - to hold for future use. |
| INSULATION | - material used to prevent the leakage of heat. |
| DIFFERENTIAL THERMOSTAT | - thermostat that works on the principle of changes in temperature. |

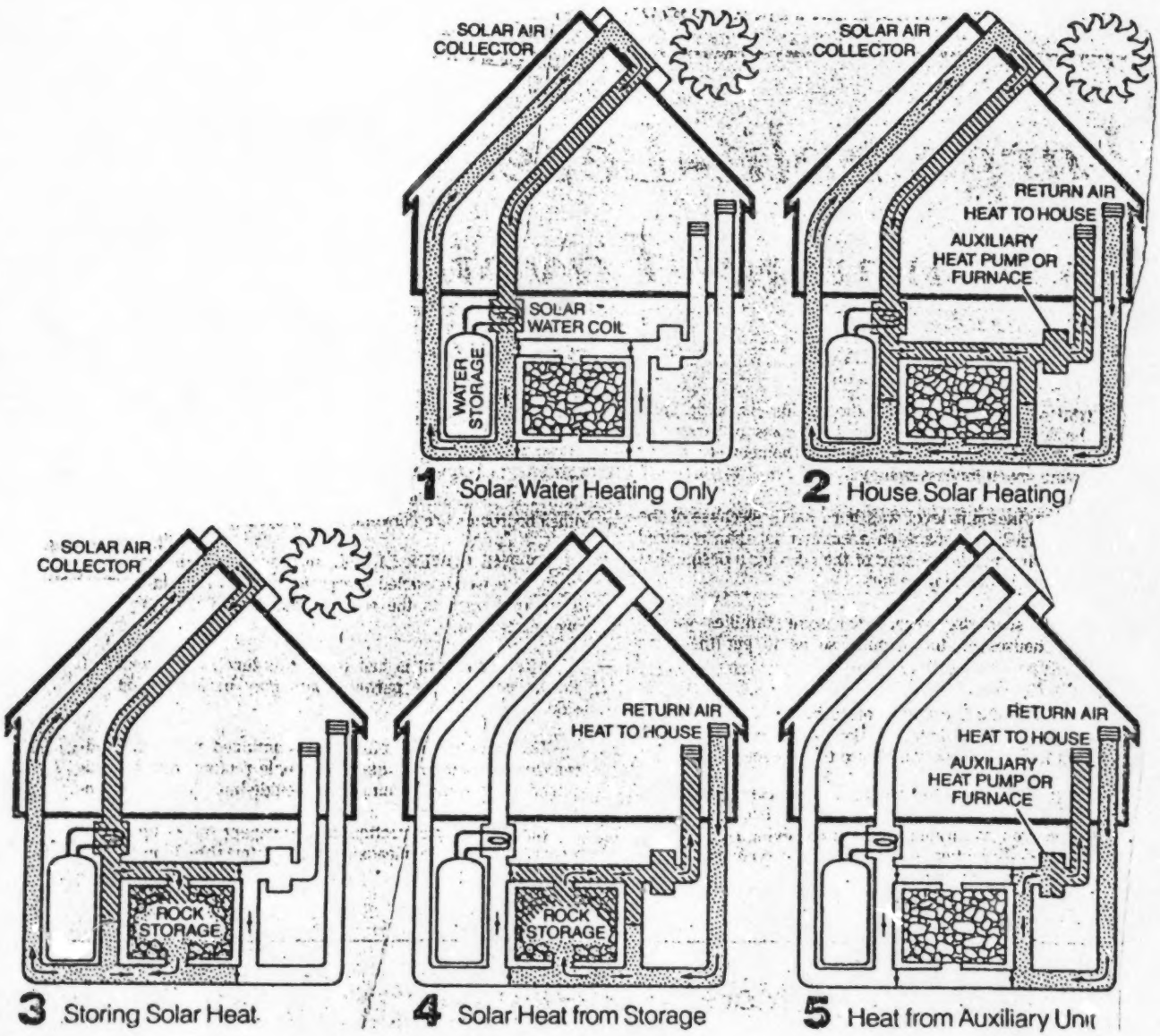
OCCUPATIONS

| | |
|---|---|
| Architect | Designer |
| Plumber | Installer |
| Builder | Engineer |

SOLAR HEATED SWIMMING POOL

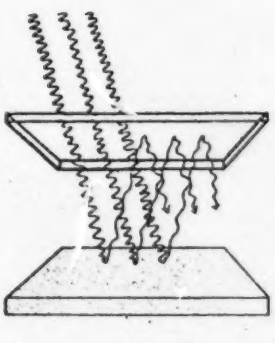


# HOW SOLAR-WARMED AIR MOVES THROUGH DEMONSTRATION HOME

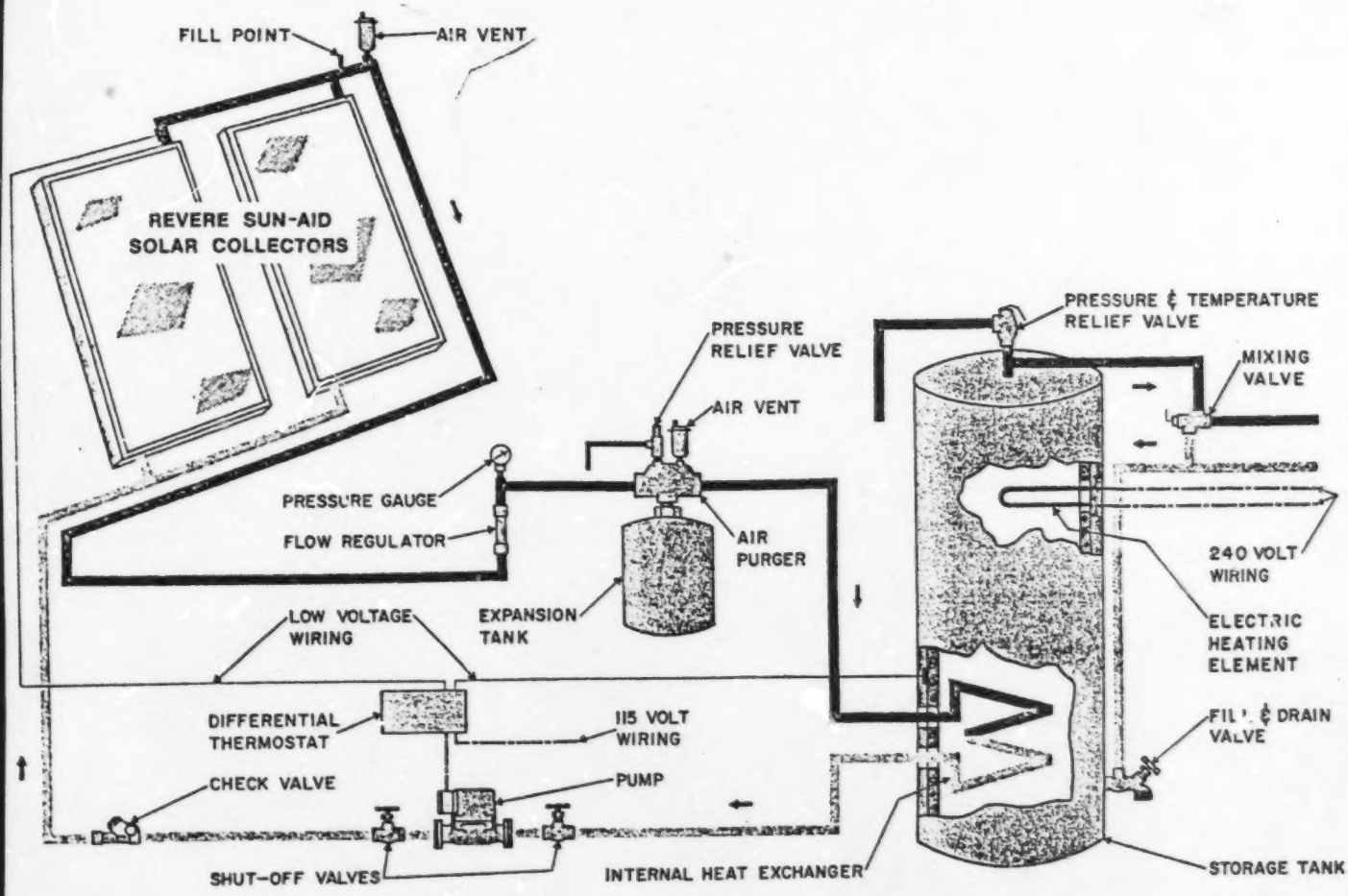


# GREENHOUSE EFFECT IN A SOLAR PANEL

**Greenhouse effect**
Solar energy penetrates the glazing material and is trapped inside and absorbed by the blackened collector plate.

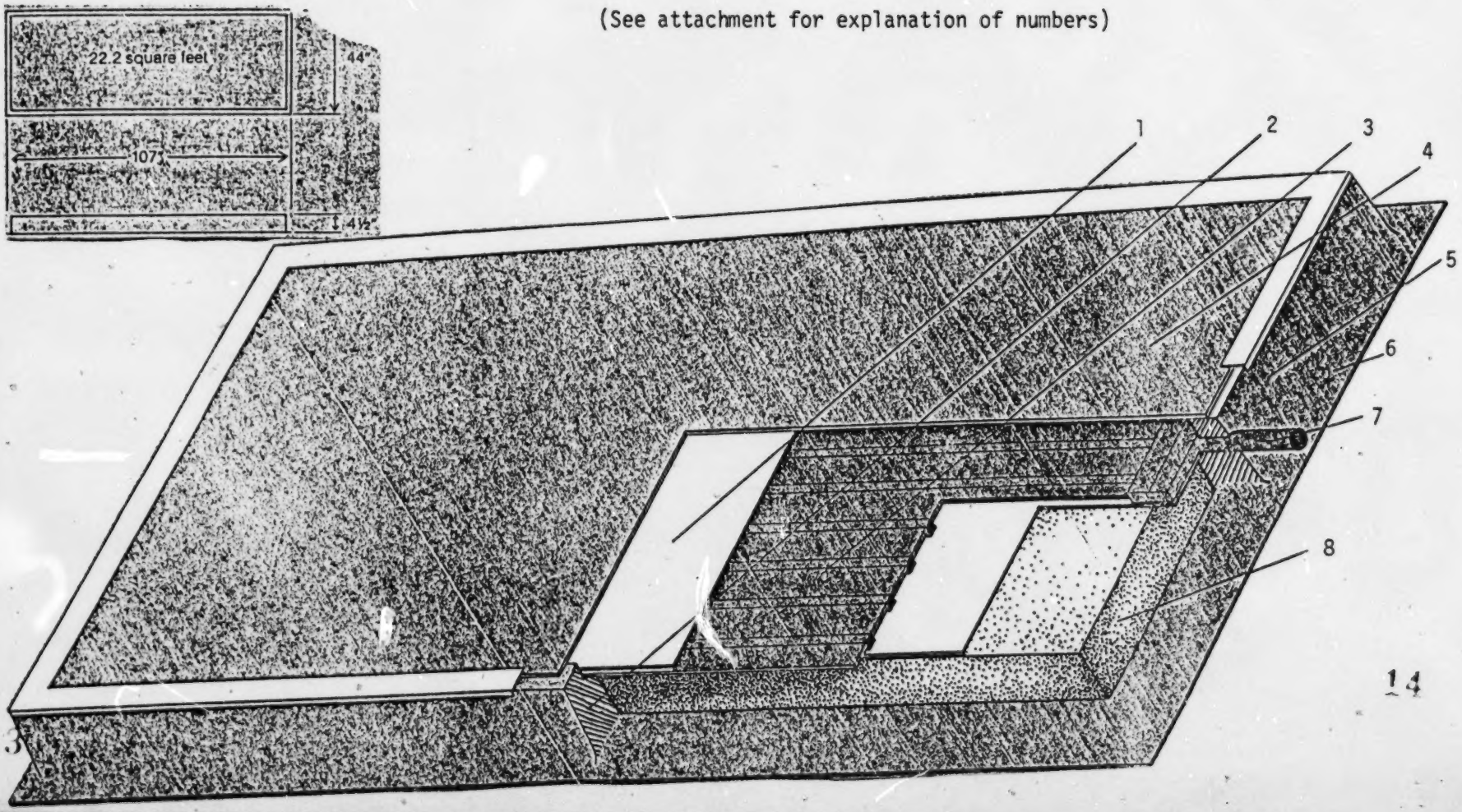


SOLAR HOT WATER



SOLAR PANEL

(See attachment for explanation of numbers)

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1. Teflon sheet between collector and aperture (optional, special order) increases collector efficiency at high inlet temperature.

2. Foam insulation sealed in rails (AVG. R21.5) prevents heat loss; foam is isolated from collector area to avoid expansion damage to collector.

3. Tube-in-sheet collector plate is strong and lightweight, made of 100% copper for excellent thermal conductivity and painted flat black for maximum absorption of sun's rays.

4. Shatterproof aperture cover is fiberglass-reinforced polyester assembled at the factory. Single glazing is standard; double glazing available on special order.(Tempered glass is also available on special order.)

5. One-piece molded fiberglass enclosure is strong and lightweight. Seamless construction eliminates air and water leaks, corrosion at joints. Unit is shipped completely assembled. Standard enclosure color is black, but it can be supplied in a choice of colors (special order).

6. Continuous 1½-in. flange around perimeter of housing adapts panel mounting to various support structures, making alignment easy and providing surface for tight weather seal.

7. Various manifolding options allow user to connect panels in the most convenient way. Outlets fit standard ½-in. OD copper tubing with no special adapters.

8. Full 2½-in. fiberglass insulation between collector plate and panel enclosure prevents heat loss through panel base.